What is claimed is:

1. A method for the preparation of a free-flowing, storage-stable fatty acid metal salt product comprising:

forming a reactive admixture comprising (a) an unsaturated fatty acid glyceride feedstock and (b) from about 1 mol to about 3 mol of at least one monovalent metal hydroxide or at least one divalent metal hydroxide; and

heating the admixture to a temperature at which said fatty acid glycerides saponify to form fatty acid metal salts in an atmosphere in which the partial pressure of oxygen has been reduced by an amount effective to provide an improvement in storage stability until a free-flowing, storage-stable product is obtained;

wherein said monovalent metal is potassium; and

wherein said divalent metal is selected from the group consisting of calcium, copper, magnesium, and zinc.

2. A method for the preparation of a free-flowing, storage-stable fatty acid metal salt product comprising:

forming a reactive admixture comprising (a) an unsaturated fatty acid glyceride feedstock comprising at least one fatty acid with more than three double bonds; (b) an antioxidant-effective amount of a stabilizing oil to provide an improvement in storage stability; and (c) from about 1 mol to about 3 mol of at least one monovalent metal hydroxide or at least one divalent metal hydroxide; and

heating the admixture to a temperature at which said fatty acid glycerides saponify to form fatty acid metal salts until a free-flowing, storage-stable product is obtained;

wherein said stabilizing oil has a fatty acid profile that is more resistant to oxidation than the fatty acid profile of said glyceride feedstock;

wherein said monovalent metal is potassium; and

wherein said divalent metal is selected from the group consisting of calcium, copper, magnesium, and zinc.

3. The method of claim 2, wherein the stabilizing oil comprises an oil or a fat comprising an antioxidant-effective amount of fatty acids having 18 or less carbon atoms and 3 or less double bonds.

4. The method of claim 3, wherein the stabilizing oil comprises tallow, soy oil, linseed oil, stearin, or a combination thereof.

5. The method of claim 2, wherein the admixture comprises from about 10 to about 90% by weight of the stabilizing oil.

6. The method of claim 2, wherein the admixture is heated to a temperature at which said fatty acid glycerides saponify to form fatty acid metal salts in an atmosphere in which the partial pressure of oxygen has been reduced by an amount effective to provide a further improvement in storage stability.

7. The method of claim 1 or 6, wherein said partial pressure of oxygen is reduced by inert gas blanketing of said admixture while heating.

8. The method of claim 7, wherein said inert gas comprises nitrogen.

9. The method of claim 1 or 6, wherein said partial pressure of oxygen is reduced by heating said admixture under vacuum.

10. The method of claim 1, wherein said unsaturated fatty acid glyceride feedstock comprises an unsaturated fatty acid concentration sufficient to form unstable metal salt products when saponified in an ambient atmosphere.

11. The method of claim 2, wherein said unsaturated fatty acid glyceride feedstock comprises an unsaturated fatty acid concentration sufficient to form unstable metal salt products when saponified in the absence of a stabilizing oil having antioxidant effects.

12. The method of claim 1 or 2, wherein said unsaturated fatty acid glyceride feedstock comprises polyunsaturated fatty acids.

13. The method of claim 12, wherein said glyceride feedstock fatty acids comprise at least one polyunsaturated fatty acid selected from the group consisting of omega-3 and omega-6 fatty acids and combinations of either or both.

14. The method of claim 13, wherein said polyunsaturated fatty acids comprise one or more omega-3 fatty acids selected from the group consisting of DHA, EPA, DPA and ALA.

15. The method of claim 12, wherein said glyceride feedstock fatty acids comprise one or more conjugated fatty acids.

16. The method of claim 15, wherein said one or more conjugated fatty acids comprise one or more CLA isomers.

17. The method of claim 1 or 2, wherein said fatty acid glyceride feedstock comprises a mixture of two or more C_{10}-C_{22} fatty acids having greater than about 45% by weight of the fatty acid content in the form of fatty acid glycerides.

18. The method of claim 17, wherein about 85 to about 100% by weight of said fatty acid mixture is in the form of fatty acid glycerides.

19. The method of claim 1 or 2, wherein said fatty acid glyceride feedstock comprises from about 40 to about 95 % by weight of unsaturated fatty acids.

20. The method of claim 1 or 2, wherein said feedstock comprises up to about 100 % by weight of marine oil.

21. The method of claim 20, wherein said marine oil is selected from the group consisting of menhaden, herring, mackerel, caplin, tilapia, tuna, sardine, pacific saury, krill, kelp, and algae oils.

22. The method of claim 21, wherein said marine oil comprises one or more omega-3 or omega-6 fatty acids selected from the group consisting of DHA, EPA, DPA, ALA, linoleic acid and arachidonic acid.

23. The method of claim 1 or 2, further comprising the step of cooling said admixture and forming a solid, free-flowing and granular fatty acid metal salt product.

24. The method of claim 23, wherein said admixture is cooled in said atmosphere in which said partial pressure of oxygen has been reduced by an amount effective to provide an improvement in storage stability.

25. The method of claim 1 or 2, wherein said heating step comprises preheating said fatty acid feed stock to a temperature from about 177°C to about 288°C and said forming step comprises rapidly forming a uniform homogeneous blend of said fatty acid feedstock and said monovalent metal hydroxide or said divalent metal hydroxide at a rate effective to produce an improvement in storage stability in said metal salt product.

26. The method of claim 1 or 2, wherein said monovalent metal hydroxide or said divalent metal hydroxide is formed in said reactive admixture by combining stoichiometric quantities of a corresponding monovalent metal oxide or divalent metal oxide and water.

27. A fatty acid metal salt prepared by the method of claim 1 or 2, wherein said metal salt comprises one or more beneficial unsaturated fatty acids.

28. A fatty acid metal salt according to claim 27, comprising polyunsaturated fatty acids.

29. The fatty acid metal salt of claim 28, wherein said polyunsaturated fatty acids are selected from the group consisting of omega-3 and omega-6 fatty acids and combinations of either or both.

30. The fatty acid metal salt of claim 29, wherein said polyunsaturated fatty acids comprise one or more omega-3 or omega-6 fatty acids selected from the group consisting of DHA, EPA, DPA, ALA, linoleic acid and arachidonic acid.

31. The fatty acid metal salt of claim 30, comprising at least one polyunsaturated fatty acid selected from the group consisting of about 1 to about 50% by weight DHA, about 1 to about 50% by weight EPA, about 1 to about 25% by weight DPA, about 1 to about 75% by weight ALA, about 0.5 to about 10 % by weight arachidonic acid, about 1 to about 80% by weight linoleic acid and about 1 to about 100% by weight CLA.

32. The fatty acid metal salt of claim 28, wherein said polyunsaturated fatty acids comprise one or more conjugated fatty acids.

33. The fatty acid metal salt of claim 32, wherein said one or more conjugated fatty acids comprise one or more CLA isomers.

34. A fatty acid metal salt prepared by the method of claim 20.

35. A fatty acid metal salt prepared by the method of claim 21.

36. A fatty acid metal salt prepared by the method of claim 22.

37. The fatty acid metal salt of claim 36, wherein said marine oil is selected from the group consisting of menhaden, herring, mackerel, caplin, tilapia, tuna, sardine, pacific saury and krill oils.

38. The fatty acid metal salt of claim 36, wherein said marine oil comprises one or more omega-3 or omega-6 fatty acids selected from the group consisting of DHA, EPA, DPA, ALA, linoleic acid and arachidonic acid.

39. A storage-stable metal salt saponification product of an unsaturated oil consisting essentially of one or more marine oils.

40. A storage-stable metal salt saponification product of an unsaturated oil feedstock consisting essentially of one or more marine oils and an antioxidant-effective amount of a stabilizing oil having fatty acid profile that is more resistant to oxidation than the fatty acid profile of said oil feedstock.

41. The saponification product of claim 39 or 40, wherein said one or more marine oils are selected from the group consisting of menhaden, herring, mackerel, caplin, tilapia, tuna, sardine, pacific saury and krill oils.

42. The saponification product of claim 39 or 40, wherein said one or more marine oils comprise one or more fatty acids selected from the group consisting of omega-3 and omega-6 fatty acids.

43. The saponification product of claim 42, wherein said one or more marine oils comprise one or more omega-3 or omega-6 fatty acids selected from the group consisting of DHA, EPA, DPA, ALA, linoleic acid and arachidonic acid.

44. The saponification product of claim 43, comprising at least one polyunsaturated fatty acid selected from the group consisting of about 1 to about 25% by weight DHA, about 1 to about 25% by weight EPA, about 1 to about 25% by weight DPA, about 1 to about 75% by weight ALA, about 0.5 to about 10 % by weight arachidonic acid, about 1 to about 80% by weight linoleic acid and about 1 to about 80% by weight CLA.

45. A storage-stable fatty acid metal salt saponification product of a fatty acid glyceride feedstock having an unsaturated fatty acid concentration sufficient to form unstable metal salt products when saponified in an ambient atmosphere.

46. The storage-stable fatty acid metal salt saponification product of claim 45, further comprising a metal salt of a stabilizing oil having a fatty acid profile that is more resistant to oxidation than the fatty acid profile of said glyceride feedstock.

47. The fatty acid metal salt of claim 45, wherein said unsaturated fatty acid glyceride feedstock comprises polyunsaturated fatty acids.

48. The fatty acid metal salt of claim 47, wherein said polyunsaturated fatty acids are selected from the group consisting of omega-3 and omega-6 fatty acids and combinations of either or both.

49. The fatty acid metal salt of claim 48, wherein said polyunsaturated fatty acids comprise one or more omega-3 or omega-6 fatty acids selected from the group consisting of DHA, EPA, DPA, ALA, linoleic acid and arachidonic acid.

50. The fatty acid metal salt of claim 49, comprising at least one polyunsaturated fatty acid selected from the group consisting of about 1 to about 50 % by weight DHA, about 1 to about 50 % by weight EPA, about 1 to about 25% by weight DPA, about 1 to about 75% by weight ALA, about 0.5 to about 10% by weight arachidonic acid, about 1 to about 80% by weight linoleic acid and about 1 to about 100 % by weight CLA.

51. The fatty acid metal salt of claim 47, wherein said polyunsaturated fatty acids comprise one or more conjugated fatty acids.

52. The fatty acid metal salt of claim 51, wherein said one or more conjugated fatty acids comprise one or more CLA isomers.

53. The fatty acid metal salt of claim 45, wherein said fatty acid glyceride feedstock comprises from about 50 to about 85% by weight of unsaturated fatty acids.

54. The fatty acid metal salt of claim 46, wherein said stabilizing oil comprises an oil or a fat comprising an antioxidant-effective amount of one or more fatty acids having 18 or less carbon atoms and 3 or less double bonds, and said glyceride feedstock comprises one or more fatty acids having 19 or more carbon atoms and 4 or more double bonds.

55. The fatty acid metal salt of claim 54, wherein the stabilizing oil comprises tallow, soy oil, linseed oil, stearin, or a combination thereof.

56. A method for increasing fertility in an animal, comprising feeding an animal in need thereof an effective amount of a composition of claim 49 comprising at least DHA or EPA.

57. The method of claim 56, wherein said animal is a male or female ruminant.

58. The method of claim 57, wherein said female ruminant is a dairy cow.

59. The method of claim 58, comprising starting the feeding of said product to said ruminant between about 21 days before and about 28 days after parturition.

60. The method of claim 59, wherein said feeding of said product to said ruminant is continued at least until conception occurs.

61. The method of claim 57, wherein said product is fed to said ruminant daily.

62. The method of claim 56, wherein said product is fed to said animal for at least 30 days after conception.

63. The method of claim 62, wherein said product is fed to said animal for at least 60 days after conception.

64. The method of claim 63, wherein said product is fed to said animal for at least 150 days after conception.

65. The method of claim 60, wherein the feeding of said product is discontinued at conception or within 150 days thereafter and said method further includes the step of feeding daily to said ruminant a second fatty acid calcium salt product for supplying milk production energy to a female ruminant after the feeding of the first product is discontinued.

66. A nutritional supplement composition comprising at least one fatty acid metal salt according to claim 27 and a biologically acceptable carrier.

67. A nutritional supplement composition comprising at least one fatty acid metal salt according to claim 41 and a biologically acceptable carrier.

68. A nutritional supplement composition comprising at least one fatty acid metal salt according to claim 45 and a biologically acceptable carrier.

69. The method of claim 1 or 2, wherein said reactive admixture comprises a plurality of said metal hydroxides.

70. The fatty acid metal salt product of claim 27 comprising a plurality of metals.

71. The fatty acid metal salt product of claim 41 comprising a plurality of metals.

72. The fatty acid metal salt product of claim 45 comprising a plurality of metals.

73. A food product for a companion animal comprising the fatty acid metal salt product of claim 27.

74. A food product for a companion animal comprising the fatty acid metal salt product of claim 41.

75. A food product for a companion animal comprising the fatty acid metal salt product of claim 45.

76. A food product for human consumption comprising the fatty acid metal salt product of claim 27.

77. A food product for human consumption comprising the fatty acid metal salt product of claim 41.

78. A food product for human consumption comprising the fatty acid metal salt product of claim 45.

79. A nutritionally beneficial fatty acid metal salt comprising an effective amount of the fatty acid metal salt product of claim 27.

80. A method of supplementing the diet of an animal comprising administering to said animal an effective amount of the fatty metal salt product of claim 27.

81. The method of claim 80, wherein said animal is a companion animal.

82. The method of claim 80, wherein said animal is a mammal.

83. The method of claim 82, wherein said mammal is a human.

84. The method of claim 83, wherein said metal salt is a calcium salt.

85. The method of claim 83, wherein said metal salt is a copper salt or a zinc salt.

86. The method of claim 83, wherein said fatty acid is an omega-3 fatty acid or an omega-6 fatty acid.

87. A pet food composition comprising an effective amount of the nutritionally beneficial fatty acid metal salt of claim 79.

88. The pet food composition of claim 87, wherein said nutritionally beneficial fatty acid metal salt is present in an amount sufficient to contribute from about 0.01 to about 5.0 percent by weight to said pet food composition.

89. The pet food composition of claim 87 comprising an extruded dry or semi-dry pet food.

90. The pet food composition of claim 87 comprising a moist pet food.

91. The pet food composition of claim 87, wherein said nutritionally beneficial fatty acid metal salt is added to said pet food composition prior to extrusion.

92. The pet food composition of claim 89, wherein said nutritionally beneficial fatty acid metal salt is dusted thereon in dry form.